

LABORATORY SAFETY PLAN

for

**[Nanophotonics Center
Room # 110]**

Date Created: 11/04/2015

**In accordance with the requirements of
Section 11 of the Chemical Hygiene Plan dated April 2015**

TABLE OF CONTENTS

Tab #	Section Description	Pages
1	Emergency Contact Information and Emergency Guidance	
	<ul style="list-style-type: none"> • Emergency Contacts 	1
	<ul style="list-style-type: none"> • Location of Emergency Response Equipment 	2
	<ul style="list-style-type: none"> • Fire Emergency Guidance 	3
	<ul style="list-style-type: none"> • Medical Emergency Guidance 	3
	<ul style="list-style-type: none"> • Severe Weather Emergency Guidance 	4
2	General Information and Policies for Use of Laboratory Safety Manual	
	<ul style="list-style-type: none"> • Locations covered by Manual 	5
	<ul style="list-style-type: none"> • Responsible Personnel 	5
	<ul style="list-style-type: none"> • Locations of Laboratory Documents 	6
	<ul style="list-style-type: none"> • Review of General Safety Requirements 	7
	<ul style="list-style-type: none"> • Minimum PPE for entering Workspace 	8
	<ul style="list-style-type: none"> • Minimum Training Requirements for working in location 	8
	<ul style="list-style-type: none"> • Guidance for using this Laboratory Safety Manual 	9
	<ul style="list-style-type: none"> • Signatures of individuals approved to work in the work space 	10
3	Training Records	11
4	Identification of Hazards in Laboratory	
	<ul style="list-style-type: none"> • Table of Hazards and Mitigation 	
	<ul style="list-style-type: none"> • General Procedures for all Hazards 	
	<ul style="list-style-type: none"> • Procedures for Particularly Hazardous Substances 	
	<ul style="list-style-type: none"> • Spill Clean-up Procedures 	12
	<ul style="list-style-type: none"> • Restricted Access activities 	
5	SOP	
	<ul style="list-style-type: none"> • Safety and Health Considerations for this Procedure 	
	<ul style="list-style-type: none"> • Spill Clean-up Guidance 	
	<ul style="list-style-type: none"> • Waste Management 	
	<ul style="list-style-type: none"> • Standard Operating Procedure 	
6	Section 11 of Chemical Hygiene Plan: Requirements for Laboratory Safety Manual	
7	Outline of responsibilities based on the Chemical Hygiene Plan and WCOE best practices	
	Chemical Inventory	

EMERGENCY CONTACT INFORMATION

TTU Police (UPD)

Emergency – 911

Non-Emergency – 742-3931

TTU Environmental Health and Safety

Daytime Emergencies (M-F, 8:00am – 5:00pm) – 742-3876

Non-daytime Emergencies (24 hrs/day, 7 days/week) – 742-3328

TTU Emergency Maintenance

Any Time – 742-3328

AFTER emergency is reported, contact:

Emergency Assistance Information

1 Group's Emergency Contact Information

Prof. Jing Li 806-401-9289

Weiping Zhao 806-317-5636

2 Advisors

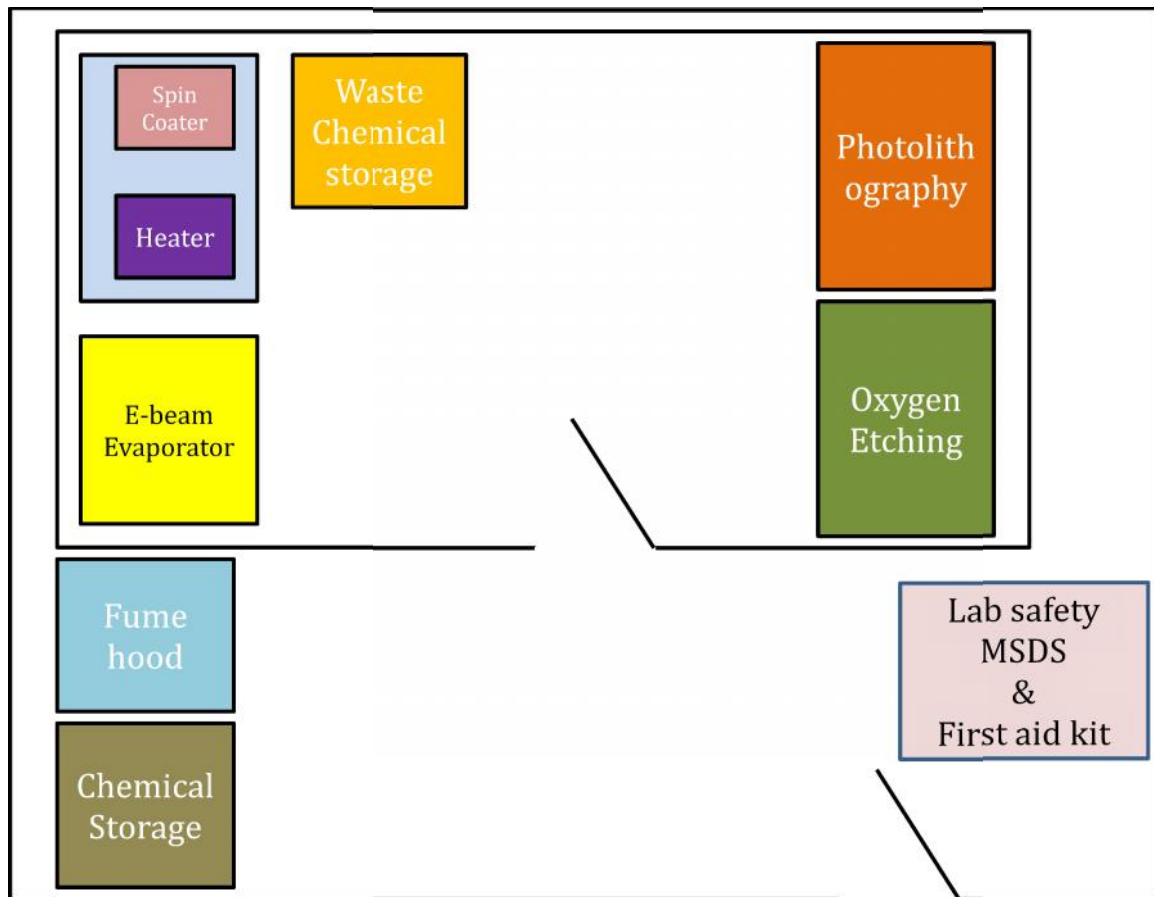
Prof. Hongxing Jiang 806-834-5739

Prof. Jingyu Lin (806) 834-5383

3 Secretary

Qing Feng (806) 834-2094

EMERGENCY RESPONSE EQUIPMENT LOCATION



FIRE EMERGENCY GUIDANCE

- If there is ever immediate danger to your person, leave laboratory immediately and call 911.
- Fire extinguisher is in the corridor in front of Room No 110
- If the building fire alarm sounds, follow emergency shutdown procedures for your experiment and leave the building through the nearest exit.

MEDICAL EMERGENCY GUIDANCE

- Know the first aid treatment for the potential hazards of your equipment that may cause bodily injury or chemical exposure. For example, some liquids when exposed to the skin should be washed with water and some should not. **KNOW THE HAZARDS YOU ARE DEALING WITH BEFORE AN EMERGENCY.**
- When in doubt, call 911.
- For minor physical injuries, the first aid kit contains antiseptic cream and cream for minor burn and is located on the right side on the entrance (see map on previous page).
- If exposed to vapors, leave area and go outside for fresh air. If you suffer any acute symptoms call 911. If you are uncertain of what to do a vapor exposure from a particular substance, call EH&S emergency number:
 - Daytime Emergencies (M-F, 8:00am – 5:00pm) – 742-3876
 - Non-daytime Emergencies (24 hrs/day, 7 days/week) – 742-3328
- If exposed to liquid chemicals, follow directions on MSDS sheet. If you suffer any acute symptoms call 911. If you are uncertain of what to do a vapor exposure from a particular substance, call EH&S emergency number:
 - Daytime Emergencies (M-F, 8:00am – 5:00pm) – 742-3876
 - Non-daytime Emergencies (24 hrs/day, 7 days/week) – 742-3328

SEVERE WEATHER EMERGENCY GUIDANCE

Flood:

The most likely cause of flooding in the building would be from ruptured water pipes or from the clogging of the drainage system in basement area. In the event that flooding is detected, complete or partial evacuation of the building should be accomplished by following the evacuation instructions of the BEM and the EAC's.

Sheltering:

Tornado:

If a tornado warning is officially issued for Lubbock County the BEM will immediately advise building occupants to take shelter.

Warnings:

The need to shelter in the event of a tornadic storm threatening TTU may be received via one or more of the following means:

- Texas Tech outdoor tornado warning sirens. The closest ones to the Electrical Engineering Building are situated atop the Industrial Engineering and Chemistry Buildings.
- If practical, the TTPD will augment the outdoor tornado sirens through the use of the "HI-LO" siren tone and the public address systems on TTPD vehicles
- The TTU Alert emergency notification system
- NOAA weather radio (The Specific Area Message Encoder (SAME) for Lubbock County is 048303
- Emergency Alert System (EAS) Radio
- Local media outlets (TV, Radio)
- Co-occupants of the building

LOCATIONS COVERED BY MANUAL

Room 110

RESPONSIBLE PERSONNEL

Principle Investigator or **Workplace Supervisor** is ultimately responsible for all activities in this workspace.

Prof. Hongxing Jiang 806-834-5739

Prof. Jingyu Lin (806) 834-5383

Laboratory Safety Captain is the liaison between the Department Safety Officer and the Principle Investigator or Workspace Supervisor. The Captain is responsible for day-to-day safety-related activities including, but not limited to, ensuring implementation of laboratory safety policies and plans and updating safety documentation.

Department Safety Officer (DSO) is the liaison between the Laboratory Safety Captains and EH&S. The DSO's duties include, but are not limited to, providing guidance on safety-related issues and ensuring compliance with the chemical hygiene plan.

Richard Woodcock 806-834-3095

All **Laboratory Personnel** are responsible ensuring their own personal safety and the safety of those around them, and for reading and understanding the Chemical Hygiene Plan and this Laboratory Safety Manual.

**LOCATION OF LABORATORY/WORKSPACE
DOCUMENTS:**

MSDS Sheets	Right hand side after entrance
Chemical Inventory	Right hand side after entrance
University Chemical Hygiene Plan	Right hand side after entrance
Laboratory Safety Manual	Right hand side after entrance
Training Records	Right hand side after entrance

Review of General Safety Requirements

This list is a summary of the minimum safety requirements detailed in the University Chemical Hygiene Plan with specific emphasis on items important to this laboratory. **THIS IS NOT A COMPLETE LIST OF REQUIREMENTS**, and is meant to remind you of daily practices that are important to all laboratory or workplace personnel. See the University Chemical Hygiene Plan or relevant sections of this Laboratory Safety Manual for more details on each item, and for additional requirements and guidance.

- Appropriate PPE must be worn by all individuals while in the laboratory when chemical, physical or biological hazards are present
- Eating, drinking, chewing gum, smoking or other use of tobacco, taking medications, and the application of cosmetics are strictly prohibited in laboratories. Storage of food, drinks, gum, candy, tobacco, cosmetics, and medications in any way is not permitted in the laboratory, unless the items are for research/experimental purposes and clearly labeled as such.
- Proper lab attire must be worn at all times in the laboratory. Perforated shoes or sandals shall not be worn in the laboratory. Shorts or other garments that expose the skin of legs or feet shall not be worn in the laboratory
- Housekeeping shall be done on an ongoing basis.
- Solvents or other chemicals that volatilize must be worked with inside a fume hood or with a localized exhaust
- All storage containers should be labeled with required information, segregated by their hazard class, and stored in an appropriate manner
- All waste containers must be labeled with required information, segregated by their hazard class, stored in an appropriate manner, and removed by Waste Management as appropriate.
- Large or heavy items are to be stored as close to ground level as possible to make them easier to move and prevent them from falling;
- Exits, emergency eyewashes and safety showers, and walkways must be completely unobstructed.
- Trip hazards must be removed or mitigated:
- Sharps in the laboratory need to be secured when not in use:
- Overhead storage must be at least 18" lower than the fire sprinkler head.
- When working with energetic or potentially energetic materials, a blast shield must be in place.
- Hazardous gas containing box doors should always be closed.

Minimum Personal Protective Equipment for Working in Laboratory or Workspace

- Safety glasses
- Lab Coat
- Latex gloves
- Long pants and closed-toe shoes

Minimum Training Requirements for Working in Laboratory or Workspace

- Chemical Hygiene Plan
- Annual Laboratory Safety Training supplied by EH&S online or by seminar
- Safety awareness
- Hazard Communication

Guidance for using this Laboratory Safety Manual

This laboratory safety manual supplements the University Chemical Hygiene Plan. It is designed to emphasize key elements of the University Chemical Hygiene Plan that are important to this laboratory or workspace, and to detail specific and additional safety requirements unique to the activities of this laboratory or workspace.

The development of the content of this manual is the responsibility of the Principle Investigator or the Workplace Supervisor and should be a collaborative effort among those with expertise in the laboratory or workspace activities and those with expertise in safety regulations and best practices. All laboratory and workspace personnel are responsible for following the regulations and recommendations of the University Chemical Hygiene Plan and the Laboratory Safety Manual.

In addition, the all Laboratory Safety Manual should be a living document that all laboratory and workspace personnel are encouraged to update and modify in order to create a safe and productive workplace for everyone.

Individuals Approved to Work in this Laboratory or Workspace

The following individuals have read and understood this Laboratory Safety Manual and all relevant documents referred to within this Laboratory Safety Manual. They have also completed all required training for working in this laboratory or workspace and are responsible for maintaining all refresher training and new training requirements. By signing this document, each person accepts responsibility for his or her actions in this laboratory. Each person named below is responsible for following all safety practices and procedures described in this document and the Chemical Hygiene Plan.

Printed Name	Signature
Dr. Hongxing Jiang	
Dr. Jingyu Lin	
Dr. Jing Li	
Weiping Zhao	
Tri C. Doan	
Avisek Maity	
Jason Guinn	

Last Updated: 11.04.2015

Training Records

[Available in Printed version at respective room]

Identification of Hazards in Laboratory

Hazard and Mitigation Table:

Hazard	Specific Name/Level	Location	Mitigation	References
Flammability	Acetone Isopropanol	In and around hood area	Use of hood, procedures, PPE	MSDS, SOP, Spill clean-up procedures attached
High Voltage		E beam evaporator	Follow procedures, PPE	SOP attached

Spill Clean-up Procedures for Specific Substances

Organic

Specific items in laboratory or workspace:

- Acetone and Isopropanol:
All sources of heat and spark should be eliminated. Air ventilation is required when necessary. protect yourself from gas or evaporative substances. Absorb the liquid. Wash away residue.
- Photoresist: Try to absorb with acetone/Isopropanol and follow the above procedure

Section 11 of University Chemical Hygiene Plan Requirements for Laboratory Safety Manual

This section is for reference only. It is copied directly from the University Chemical Hygiene Plan for your convenience.

- 11.1 The Laboratory Safety Plan is a document that is specific to a particular laboratory. This document is to identify potential hazards in the laboratory and give guidance for laboratory personnel in the event of an incident. The most recent version of the Laboratory Safety Plan must be available in a hard copy. This document shall at minimum contain:
- 11.1.1 The laboratory locations that are covered in the plan;
 - 11.1.2 Responsible party for the laboratory locations that are covered in the plan;
 - 11.1.3 Emergency contact information for the responsible party for the laboratory locations including the DCHO's contact information;
 - 11.1.4 Location of MSDSs, University Chemical Hygiene Plan and any other laboratory documents;
 - 11.1.5 Rules and policies of the laboratory that are not less stringent than the CHP;
 - 11.1.6 Identification of hazards in the laboratory;
 - 11.1.7 Clean-up procedures in case of a spill;
 - 11.1.8 Guidance on what to do in an case of emergency (e.g. fire, medical emergency, severe weather, etc.);
 - 11.1.9 SOPs generated for the laboratory;
 - 11.1.10 Acknowledgement sheet that all individuals working in the laboratory are required to sign that states they have read and understand the plan and will follow what is out lined in the plan.
- 11.2 Where hazardous chemicals are used in the workplace, the laboratory shall develop and carry out the provisions of a written Laboratory Safety Plan which:
- 11.2.1 Informs employees and students of physical and health hazards associated with hazardous chemicals in that laboratory; and
 - 11.2.2 Discloses the Permissible Exposure Limits that employees should keep exposures below.
- 11.3 The Laboratory Safety Plan shall be readily available to employees, employee representatives, and regulatory agencies upon request.
- 11.4 The Laboratory Safety Plan shall include each of the following elements and shall indicate specific measures that the department will take to ensure laboratory employee protection:
- 11.4.1 Standard operating procedures incorporating safety and health considerations when laboratory work involves the use of hazardous chemicals and a waste stream analysis to determine what products are produced and how to properly dispose of them;

- 11.4.2 Criteria that the laboratory will use to determine and implement control measures for reducing employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices giving particular attention to the selection of control measures for chemicals that are known to be extremely hazardous;
- 11.4.3 Requirements that laboratory hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;
- 11.4.4 Records of employee/student training;
- 11.4.5 The circumstances under which a particular laboratory operation, procedure, or activity shall require knowledge or presence of appropriate responder;
- 11.4.6 Provisions for medical consultation and medical examinations;
- 11.4.7 Designation of personnel responsible for implementation of the Laboratory Safety Plan; and
- 11.4.8 Provisions for additional employee protection for work with particularly hazardous substances. These include, but are not limited to, "select carcinogens", reproductive toxins and substances which have a high degree of acute toxicity. Specific considerations shall be given to the following provisions which shall be included where appropriate:
 - 11.4.8.1 Establishment of a designated area;
 - 11.4.8.2 Use of containment devices such as laboratory hoods or glove boxes;
 - 11.4.8.3 Procedures for safe removal of contaminated waste; and
 - 11.4.8.4 Decontamination procedures.
- 11.5 If dangerous activities are being conducted in the laboratory that require restricted access;
 - 11.5.1 A temporary sign must be posted on the door stating what activity is being conducted:
 - 11.5.1.1 The sign must clearly state who is conducting the experiment;
 - 11.5.1.2 The sign must have contact information of the individual(s) conducting the experiment;
 - 11.5.1.3 The sign must state the start date/time and expected stop date/time of the experiment;
 - 11.5.1.4 The sign must state specifically who is to have access to the laboratory;
 - 11.5.1.5 The sign must state what additional PPE, engineering controls and precautions must be used when entering the laboratory while the experiment is in progress.
 - 11.5.2 The UCHO, DCHO, and Departmental Chair must be notified of what activities require restricted access.

List of Roles and Responsibilities

Based on University Chemical Hygiene Plan and WCOE Best Practices

DEPARTMENT SAFETY OFFICER: (also referred to as the Departmental Chemical Hygiene Officer (DCHO) in the University Chemical Hygiene Plan): This individual is appointed by the head of the department. The appointment of the Department Safety Officer must be relayed to the Environmental Health and Safety (EH&S) Office. The Department Safety Officer will be the contact between the department and EH&S.

Responsibilities:

- Act as liaison between department personnel and EH&S.
- Work with department personnel to understand safety requirements and best practices.
- Report any incident involving chemicals to the EH&S immediately. When appropriate:
 - Perform an initial evaluation of incidents and look for possible overexposure;
 - Assess the need for medical consultation/examination;
 - Assess the need for employee medical monitoring;
 - Assist in scheduling medical examinations for employees;
 - Notify the EH&S of the need for medical monitoring, consultation and/or examination;
- Provide the EH&S with a list of laboratories that are in use, and the responsible party for the laboratory on a yearly basis.
- Perform announced and/or unannounced safety and housekeeping inspections, including routine inspections of emergency equipment, and document the findings.
 - Departmental chair and PI/lab manager shall be informed of results of inspections and documentation shall be made available to the EH&S upon request.
 - EH&S has the authority to remove any individual from a laboratory and/or take pictures of any individual or area in the laboratory that are not in compliance or following the practices outlined in the University Chemical Hygiene Plan or the Laboratory Safety Plan for the laboratory in question.
- Maintain a list of laboratories affected by the Chemical Hygiene Plan (CHP) and supply this list to EH&S when there are updates.

PRINCIPAL INVESTIGATOR/WORKPLACE SUPERVISOR: Each laboratory shall have a Principal Investigator or Laboratory Supervisor assigned to it.

- Prepare and implement a Laboratory Safety Plan documented in a Laboratory Safety Manual.
- Appoint a member of the laboratory as the Laboratory Safety Captain and document the captain's responsibilities.
- Either personally or through a delegate, the Principle Investigator or Workplace Supervisor must:
 - Ensure containers are labeled with required information, segregated by their hazard class and stored in an appropriate manner.
 - Perform a hazard determination of chemicals generated within the laboratory.
 - Ensure all individuals who enter their lab(s) know and follow the chemical hygiene rules, that personal protective equipment is available and protective equipment is in working order.
 - Prepare written procedures for all operations conducted in the laboratory.
 - Date receipt and track the age of peroxide forming compounds.
 - Test peroxide formers for peroxide formation every three to six months.
 - Provide regular chemical hygiene and housekeeping inspections, including routine inspections of emergency equipment using Appendix C of the University Chemical Hygiene Plan.
 - Determine required levels of protective apparel and equipment and document this information in written procedures.
 - Ensure facilities and training for use of any material or piece of equipment being ordered or used are adequate.
 - Notify the Department Safety Officer and EH&S of the need for medical monitoring, consultation and/or examinations.
 - Supply all appropriate PPE to all individuals entering the laboratory and ensure that the PPE is used.
 - Ensure that all laboratory personnel with access to his/her laboratory have taken Laboratory Safety Training prior to being given permission to enter the laboratory.
 - Ensure that all laboratory personnel having access to their laboratory are in compliance with the CHP;
 - Ensure that chemical containers are labeled with required information.
 - Check eyewashes weekly to make sure they are running properly and if they need maintenance contact TTU Building Maintenance and Construction to repair.
 - Check fire extinguishers to make sure they are charged and in date and if they have not been inspected within the last year or they are not charged contact the TTU Fire Marshalls' office at 742-0145 or 742-0146 to have them serviced.

- Appoint a member of the laboratory that is responsible for preparing and updating the list of chemicals in the laboratory and providing this list to the Department Safety Officer and EH&S.

LABORATORY SAFETY CAPTAIN

The Laboratory Safety Captain will serve as the liaison between the PI, laboratory group members, Department Safety Officer and EH&S. The responsibility of the Laboratory Safety Captain will be outlined by the respective departments and PIs.

LABORATORY PERSONNEL (ANYONE WORKING IN A LABORATORY):

- Follow all procedures outlined in the University Chemical Hygiene Plan and the Laboratory Safety Manual.
- Adhere to recommendations made by the Laboratory Safety Captain, Principal Investigator, Department Safety Officer, and EH&S.
- Undergraduate and graduate students will receive annual Laboratory Safety Training supplied by EH&S online or by seminar. Principal Investigators and laboratory supervisors will receive biannual Laboratory Safety Training supplied by EH&S online or by seminar.
- Receive additional training that is required that is listed in the Laboratory Safety Manual(see Tab 2).